XXV. NWA 998

clinopyroxenite
456 grams

Figure XXV-1*: Photograph of 165 g end piece of NWA 998 by Adam and Greg Hupé (with permission)*

Introduction

Russell *et al.* (2003) report that a piece of a nakhlite, found in Morocco in September 2001, was purchased by A. and G. Hupé from dealers at the February 2002 Tucson Gem and Mineral Show. Figure XXV-1 shows what appears to be a broken or sawn "slab", with a fusion crust around the outside.

Petrography

The texture of NWA 998 is that of a hypabyssal, adcumulate igneous rock. According to Irving *et al.* (2002), the crystallization sequence was olivine, orthopyroxene, titanomagnetite, augite, apatite and plagioclase. This meteorite may not be highly shocked.

Mineral Chemistry

Olivine: Olivine is Fo_{36}.

Pyroxenes: The dominant mineral is clinopyroxene $Wo_{39}En_{78}$. Minor othropyroxene is Wo_4En_{51}. Pyroxene contains tiny melt inclusions.

Plagioclase: Interstitial plagioclase exhibits normal birefringence and is An_{39}. Plagioclase is blocky, rather than sheath-like as in other nakhlites.

Opaques: Symplectitic intergrowths of titanomagnetite and low-Ca pyroxene are present at grain boundaries between large, discrete olivine and titanomagnetite grains. Cr-titanomagnetite inclusions occur within olivine.

Secondary minerals: Ankeritic carbonate, K-feldspar, (?) serpentine, calcite and a Ca-sulfate are present on grain boundaries. Irving *et al.* (2002) suggest that these *secondary minerals* may have a pre-terrestrial origin.

Whole-rock Composition

None reported

Other Isotopes

Oxygen isotopes of acid-washed augite, as determined by D. Rumble (reported by Russell *et al.* 2003), were $\delta^{18}O = +3.9 \pm 0.2$, $\delta^{17}O = +2.4 \pm 0.01$ and $\Delta^{17}O = +0.30 \pm 0.02$ ‰.